

Molecular Breast Imaging: A Multicenter Clinical Registry to Compare Breast-Specific Gamma Imaging (BSGI) and Breast MRI in the Detection of Breast Carcinoma

Jean Weigert¹, Douglas A. Kieper², Lillian Stern³, Marcela Böhm-Vélez

1. Department of Radiology, Mandell and Blau MDs PC, New Britain, CT, 2. Hampton University, Hampton VA, 3. Department of Radiology, Thomas Jefferson University, Methodist Division, Philadelphia, PA., 4. Weinstein Imaging Associates, Pittsburgh, PA

Objectives

Breast-Specific Gamma Imaging (BSGI), also known as molecular breast imaging (MBI), is a diagnostic breast imaging procedure using that is becoming more common in clinical practice. In the BSGI procedure, a patient receives an intravenous injection of Tc99m-Sestamibi (MIBI) and imaging is conducted with a breast-optimized gamma camera. According to the clinical literature, the largest advantage of BSGI when compared to mammography is that the sensitivity of the examination is not influenced by breast tissue density. The goal of this work is to quantify the clinical sensitivity of BSGI against that of MRI, another diagnostic imaging modality capable of detecting mammographically occult malignancies.

Methods

A multi-center patient registry was maintained for all patients routinely sent to BSGI and MRI as part of their diagnostic work up. All patients who had a malignant finding on subsequent needle biopsy or surgery within 12 months post imaging were included in this analysis. The BIRADS rating schematic was used for MRI and a similar, 6-category system was used for the BSGI images. For each modality, the reports were classified as Negative: category 1 – 3 and positive: category 4 - 6.

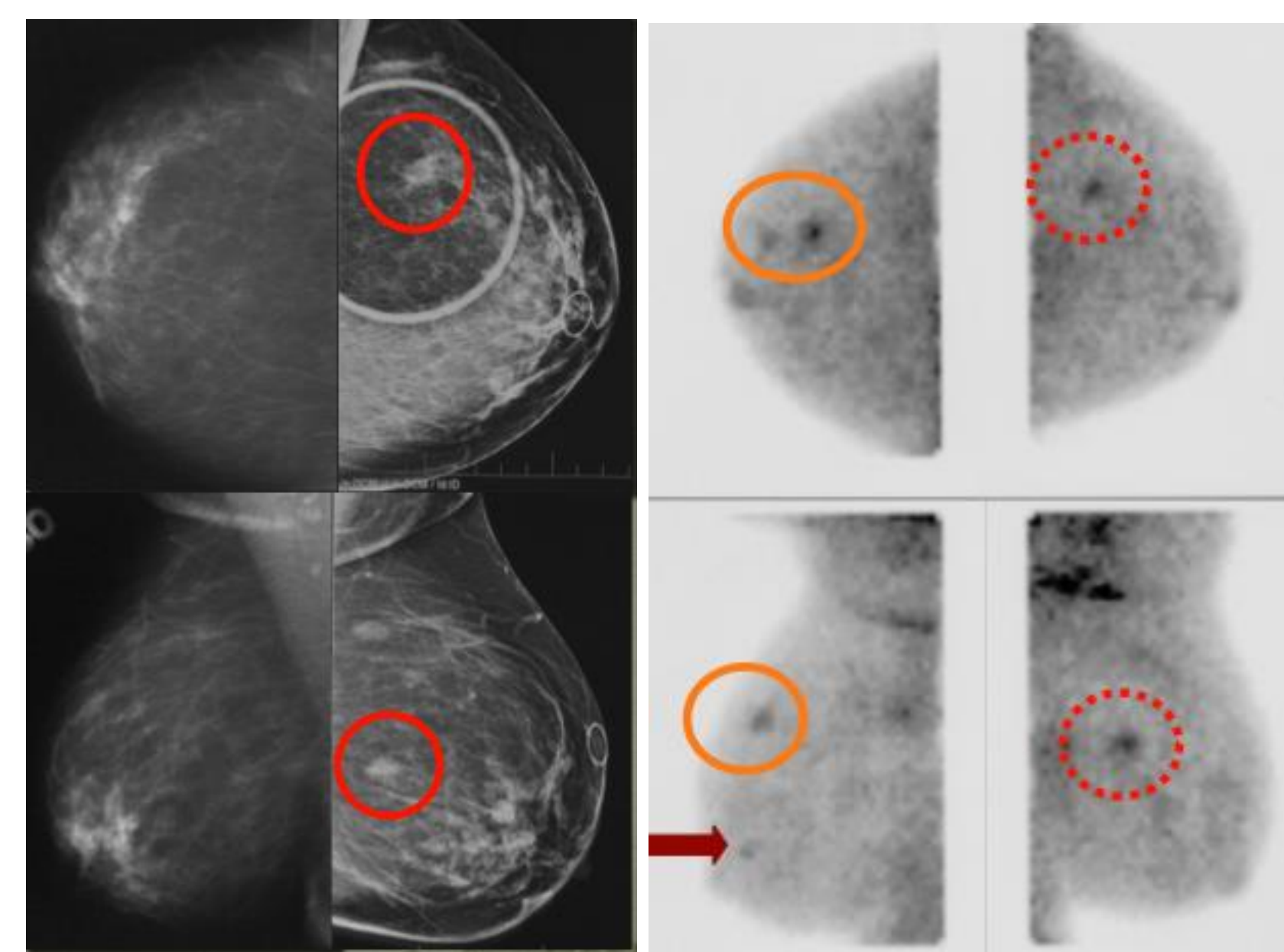
Results

There were 60 patients with 63 malignant breast lesions. MRI was negative in 6 lesions (2 DCIS, 3 IDC and 1 ILC) while BSGI was negative in 6 lesions (5 IDC and one mixed IDC/DCIS). Both BSGI and MRI detected 56 of the 63 malignancies providing a sensitivity of 89% for both modalities. The combination of BSGI and MRI detected 63 of the 63 malignancies for a sensitivity of 100%.

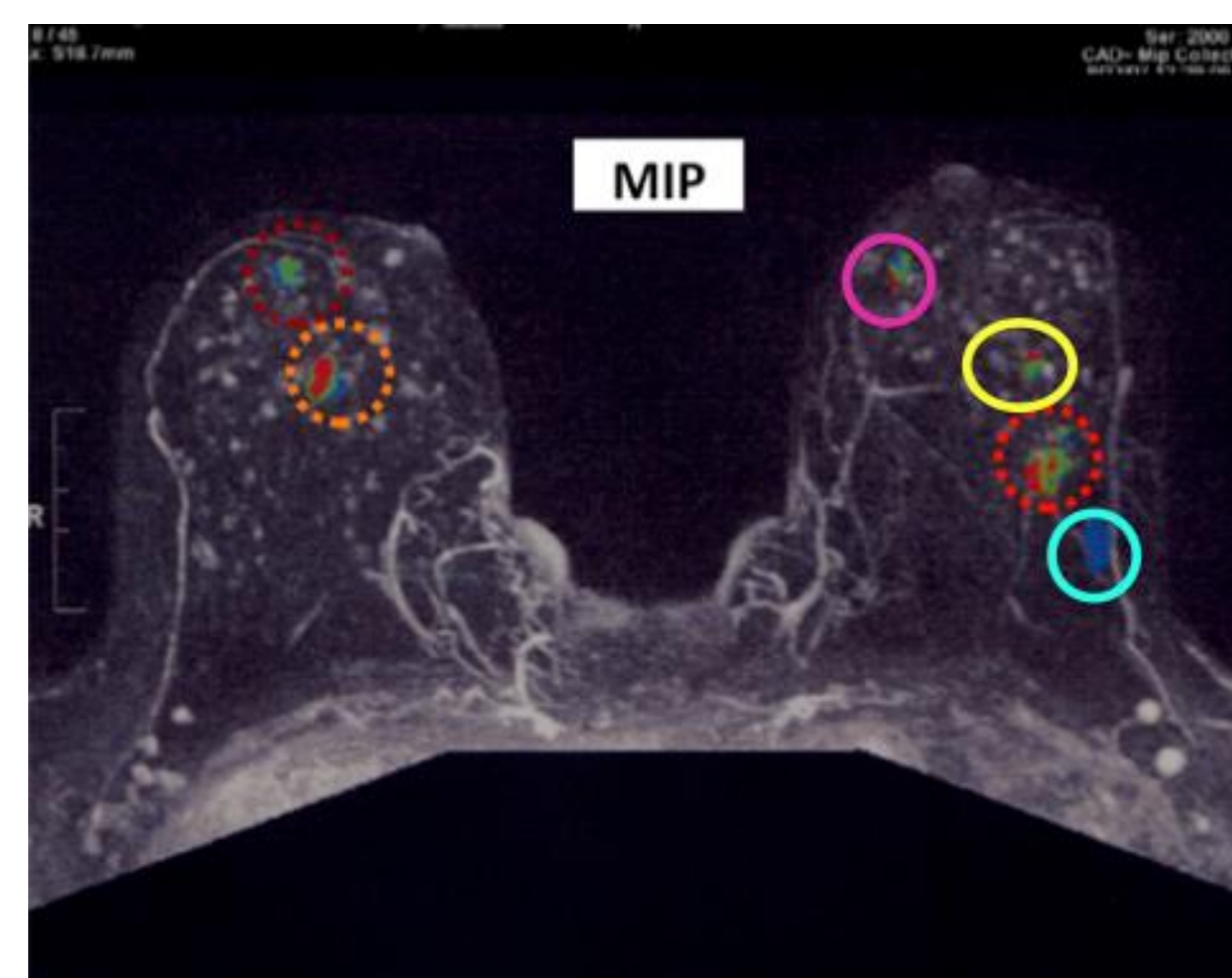
Example Patient History – courtesy Mike Linver, X-Ray Associates of New Mexico

Screening mammogram (below left): A new nodular density is noted in the left breast: suspicious for malignancy. Needle biopsy of this region demonstrates an invasive ductal carcinoma. A preoperative MRI is suggested for this patient as part of the pre-surgical planning. The patient is highly claustrophobic and refused the MRI. She consented to the BSGI as an alternative to MRI.

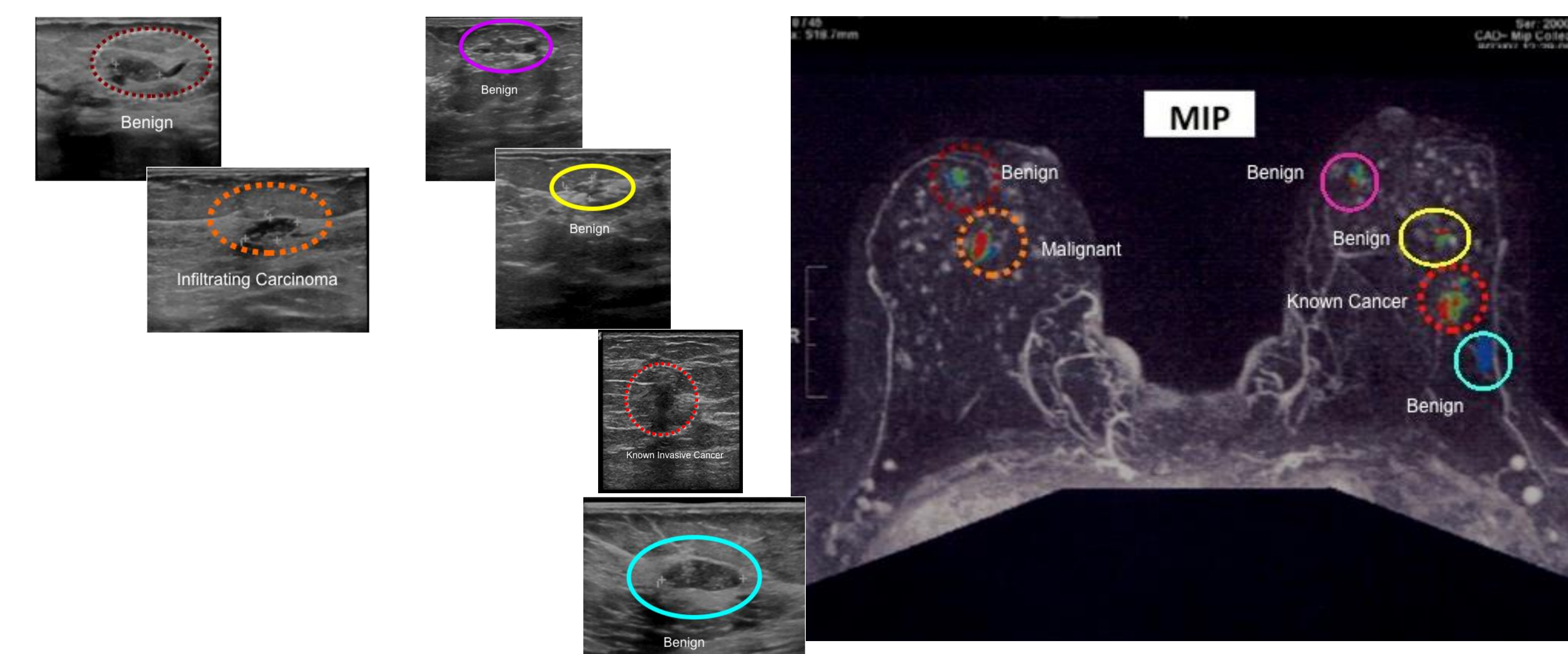
BSGI (below right): There is a normal bilateral nipple uptake in the breasts. There are three additional areas of focal uptake: one in the area of the known malignancy in the left breast and two additional foci in the anterior portion of right breast, just lateral of the nipple. One slightly superior to the nipple line and one approximately 3cm above it.



MRI (below): the breast radiologist consulted the patient following the BSGI scan and obtained the patient's consent for MRI with sedation. The MRI demonstrated enhancement in the known cancer and both of the previously identified contralateral lesions. There were three additional areas of enhancement in the ipsilateral breast. One lateral and posterior to the known cancer and two anterior and medial to it.



US guided biopsy: Needle biopsy was conducted on the 6 regions noted on MRI yielding 4 benign and 2 malignant lesions.



Case Summary: MRI was positive in 6 lesions: 4 benign and two malignant while MBI/BSGI was positive in 3 lesions: both malignant and one benign.

Conclusions

According to the results of this patient registry, BSGI provides equal sensitivity to that of MRI however each modality was false-negative in different patients. As a result, while each modality provided a sensitivity of 89%, the combination of BSGI and MRI provided a sensitivity of 100%.

The MBI/BSGI procedure does involve a relatively small dose of radiation, but this dose is less than the dose patients receive from other common diagnostic examinations such as a chest CT scan. According to RadiologyInfo.org, a website co-developed by the American College of Radiology and Radiological Society of North America, "...there are no known long-term adverse effects from such low-dose exposure." In comparison, MRI does not involve exposure to radiation but utilizes a contrast agent that has been reported to cause adverse reactions in a very small number of patients, especially those with insufficient kidney or liver function. In addition, MRI cannot be performed in some types of patients such as those with metal implants, or those with acute claustrophobia. In our experience, BSGI is a low-cost imaging procedure (the procedure costing approximately 1/3 that of MRI) that is well tolerated by patients and can be used in patients who for whom MRI is contraindicated or very challenging.